

**VERIZON VIRGINIA INC. PANEL TESTIMONY ON
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1

2 **Q. How was the forward-looking utilization for analog line ports**
3 **determined?**

4 A. The utilization of analog lines is set at [VERIZON VA PROPRIETARY
5 **BEGINS] XXX [VERIZON VA PROPRIETARY ENDS]**, which is
6 Verizon VA's current operating objective utilization. Verizon VA's actual
7 utilization for these ports is [VERIZON VA PROPRIETARY **BEGINS]**
8 **XXX [VERIZON VA PROPRIETARY ENDS]**.

9

10 **Q. Does the SCIS model allow for administrative spare in its cost**
11 **calculation?**

12 A. Yes. SCIS allows for administrative spare for trunks and lines. Verizon VA
13 explains the concept of administration spare in the loops section above.
14 Verizon VA used the following administrative spare capacity fills:
15 **[VERIZON VA PROPRIETARY BEGINS] XXX [VERIZON VA**
16 **PROPRIETARY ENDS]** for digital trunk ports, [VERIZON VA
17 **PROPRIETARY BEGINS] XXX [VERIZON VA PROPRIETARY**
18 **ENDS]** for digital line ports, and [VERIZON VA PROPRIETARY
19 **BEGINS] XXX [VERIZON VA PROPRIETARY ENDS]** for analog line
20 ports.

21

1 Q. Please explain the concept of breakage.

6

10

15

17 Q. How did Verizon VA calculate port material investments?

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1 A. Unit material investments for the line and trunk port components were
2 obtained directly from the SCIS model office outputs,⁴ then adjusted as
3 described above. The material investment associated with the trunk port was
4 expressed on a per-port (Dedicated) basis and on an all hours of the day
5 (AHD)⁵ per-minute-of-use (MOU) (Common) basis.

6
7 **Q. Why was the Trunk Port cost calculated on both a per-port basis and an**
8 **AHD-MOU basis?**

9 A. The trunk port was calculated on a per-trunk basis for those carriers who wish
10 to purchase dedicated trunk ports. Verizon VA also calculated the trunk port
11 on an AHD-MOU basis for those carriers who simply purchase switching on
12 a per-minute basis (*i.e.*, through the UNE-Platform).

13
14 **Q. How were the material investments associated with trunk ports**
15 **converted to a per-MOU basis?**

⁴ SCIS Version 2.8, used in the Local Switching cost studies, does not contain the investments associated with Nortel's SONET trunk peripherals (Spectrum Peripheral Modules) for the DSM-100 and DMS-200. Verizon VA, along with Telcordia, has verified that the SCIS investment between these two types of peripherals has an insignificant impact on the costs.

⁵ "All Hours of the Day" means averaged over all time-of-day periods.

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1 A. Verizon converted the busy hour MOU capacity (adjusted to the midpoint of
2 the planning cycle) of the trunk port to annual MOU by the application of the
3 busy-hour-to-annual ratio. The annual MOU was then divided by 12 months
4 to arrive at monthly MOU. The monthly cost of the trunk port was divided
5 by the monthly MOU to arrive at a cost per MOU. This calculation can be
6 found in the cost study at VZ-VA CS, Vol. VI, Part C-8.

7
8 **Q. How were the investments associated with coin ports developed?**

9 A. Verizon VA obtained the incremental investments associated with coin ports
10 from SCIS.

11

12 **5. Usage**

13 **Q. How did Verizon VA calculate the Local Switch Usage material**
14 **investments?**

15 A. Verizon subtracted the total material investment for the line and trunk port
16 components from the SCIS model office outputs from the total SCIS
17 investment to arrive at a total switch usage investment. This investment
18 (usage) represents all switch investment, without the trunk port and line port
19 investments, and includes features.

20

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1 **Q. How did Verizon VA convert the material investment associated with**
2 **usage to MOU increments?**

3 A. Verizon VA divided the usage investment by the busy hour total switch MOU
4 capacity (adjusted to the midpoint of the planning cycle) to arrive at a busy
5 hour MOU investment for usage.

6
7 **Q. Please explain how busy hour total switch MOU capacity was**
8 **determined.**

9 A. SCIS develops an average busy hour CCS (hundred calling seconds) per line,
10 per switch technology. Multiplying this CCS per line times the number of
11 lines in each switch technology yields the total busy hour CCS per switch
12 technology. The sum of the total busy hour CCS for all three switch
13 technologies (5ESS, DMS-100, and EWSD) yields the total busy hour CCS
14 for the switch network. The total switch busy hour CCS is then converted to
15 total switch busy hour MOU capacity by multiplying it times 100 divided by
16 60.

17
18 **Q. How was the mid-point of the total switch busy hour MOU determined?**

19 A. Verizon VA took the compounded percent of growth of CCS per line over the
20 planning period and added it to the compounded percent of growth of number
21 of lines over the planning period. Half of this sum represents the mid-point

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1 in the planning cycle. One minus this percentage was multiplied times the
2 total switch busy hour MOU capacity to arrive at the mid-point of the total
3 switch busy hour MOU capacity.

4
5 **Q. How was the total investment per busy hour MOU converted to a cost**
6 **per AHD MOU?**

7 A. The total investment per busy hour MOU was converted to a total cost per
8 busy hour MOU by the application of annual cost factors and investment
9 related loadings as previously described in this testimony. This total was
10 converted to an AHD MOU cost by the application of the busy hour to AHD
11 conversion factor, discussed above.

12
13 **Q. Are the Local Switching Usage originating and terminating MOU costs**
14 **that Verizon VA is proposing applicable to both intra- and inter-switch**
15 **calls?**

16 A. Yes. The entire capacity of MOU (originating minutes *plus* terminating
17 minutes) was used to develop the per-MOU costs of Local Switch Usage.
18 The costs associated with a terminating MOU is the same cost for a
19 terminating MOU for any call type (intra-switch or inter-switch). Likewise,
20 the cost associated with an originating MOU is the same cost for originating
21 MOU for any type of call (intra-switch or inter-switch).

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2 **Q. Is Verizon VA proposing to charge the originating usage rate for all**
3 **originating minutes, and the terminating usage rate for all terminating**
4 **minutes?**

5 A. Yes. Verizon VA separated its total switching usage costs into terminating
6 and originating costs.

7

8 **Q. Please explain non-conversation time (NCT) and how it relates to usage**
9 **costs.**

10 A. Conversation time is the actual time (in MOU) that switch resources are
11 being used during the conversation part of each call. Non-conversation time
12 represents the time that switch resources are being used other than during the
13 actual conversation time. For example, NCT includes the time required for
14 dialing the call, ringing, and call set-up. It also includes the time associated
15 with calls that are not completed (that is, the called party does not answer).
16 Since non-conversation times are not measured by the switch's billing
17 recordings, and thus cannot be billed, Verizon must include an NCT additive
18 in the conversation minutes (MOUs) to account for these times. The ratio of
19 (conversation minutes plus NCT) to (conversation minutes) is multiplied by
20 the cost per MOU to recover the costs associated with non-conversation time.

21

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1 **Q. Please explain right-to-use fees.**

2 A. RTU fees are the software costs associated with the vendor's software.
3 Because digital switches are processor controlled, extensive software is
4 required.

5
6 **Q. Please explain how RTU fees were included in Local Switching Usage?**

7 A. The right-to-use factor was applied against the total in-place MOU busy hour
8 investment to arrive at a right-to-use cost per busy hour MOU. This cost was
9 then added to the switch busy hour MOU usage cost to arrive at a total busy
10 hour MOU cost for local switch usage.

11

12 **6. Reciprocal Compensation Usage**
13 **(Terminating)**

14 **Q. Please explain why Verizon VA is filing a separate usage (terminating)**
15 **cost for reciprocal compensation.**

16 A. Section 251(b)(5) of the Act states that all LECs have "[t]he duty to establish
17 reciprocal compensation arrangements for the transport and termination of
18 telecommunications." Reciprocal compensation arrangements include the
19 mutual and reciprocal recovery of costs through cash payments or other
20 non-cash transactions such as bill-and-keep arrangements. Additionally,
21 incumbent local exchange carriers are obligated to provide interconnection
22 "on rates, terms, and conditions that are just, reasonable, and

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1 nondiscriminatory.”⁶ In § 252(d)(2)(A), the Act specifies that a state
2 commission can not consider the terms and conditions to be just and
3 reasonable unless,

4 (i.) such terms and conditions provide for the mutual and
5 reciprocal recovery by each carrier of costs associated with the
6 transport and termination on each carrier’s network facilities
7 of calls that originate on the network facilities of the other
8 carrier; and

9 (ii) such terms and conditions determine such costs on the basis of
10 a reasonable approximation of the *additional costs* of
11 terminating such calls. (emphasis added)

12 Verizon VA has therefore appropriately filed costs associated with the
13 *additional costs* of terminating such calls.
14

15 **Q. Please explain how the Reciprocal Compensation Usage cost was**
16 **developed.**

17 A. Verizon VA determined the costs associated with basic usage (no features) as
18 previously described for Local Switch usage. Verizon VA excluded,
19 however, the getting started⁷ investments identified by SCIS and RTUs.

⁶ Telecommunications Act of 1996, 47 U.S.C. § 251(c)(2)(D).

⁷ “Getting started” investments represent the investments associated with switch processor and memory, and are not impacted by the additional reciprocal compensation usage.

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1

2

7. Port Additives

3

**Q. How were the investments associated with the “port additives”
developed?**

4

5

A. As previously described, port additives are optional switch features that require specific, unique hardware. Verizon VA determined the incremental hardware investments associated with these port additives by running each feature through SCIS/IN. SCIS/IN is the module of SCIS that calculates incremental investments associated with specific features of the switch. A more detailed discussion of SCIS/IN can be found in the Cost Manual.

6

7

8

9

10

11

12

**Q. How were the material investments described above converted to
monthly costs?**

13

14

A. The material investments were converted to total in-place investments by the use of loading factors for power, EF&I, and L&B, then converted to monthly costs with the application of annual cost factors, as previously described in this testimony.

15

16

17

18

19

D. TANDEM SWITCHING

20

1. Element Description

21

Q. What is the Tandem Switching element?

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- 1 A. Tandem Switching is defined in FCC Rule 47 C.F.R. 51.319(c)(2), Local
2 Tandem Switching Capability. The Tandem Switching capability network
3 element is defined as:
- 4 (i) Trunk-connect facilities, which include, but are not limited to, the
5 connection between trunk termination at a cross connect panel and
6 switch trunk card;
- 7 (ii) The basic switch trunk function of connecting trunks to trunks; and
- 8 (iii) The functions that are centralized in tandem switches (as
9 distinguished from separate end office switches), including but not
10 limited, to call recording, the routing of calls to operator services, and
11 signaling conversion features.

12

13 **Q. Please define the Tandem Switching element used in Verizon VA's**
14 **forward-looking incremental cost study.**

15 A. The Tandem Switching element used in Verizon VA's cost study consists of
16 trunk ports (digital) and usage. Trunk ports are either dedicated or common.
17 Dedicated tandem trunk ports are recovered on a monthly basis, while
18 common tandem trunk ports are recovered on a per-minute-of-use basis.

19

20 **2. Technology Assumptions**

21 **Q. Please describe the forward-looking tandem switch technology**
22 **assumptions.**

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1 A. The forward-looking tandem switch construct reflects a mix of 20.73% 5ESS
2 (Lucent type) and 79.27% DMS-200 (Nortel type) technologies, based on the
3 number of trunks placed at current tandem locations.

4
5 **Q. Please describe how Verizon VA determined this mix of 5ESS and DMS**
6 **technologies.**

7 A. Verizon VA's engineers provided existing office parameters, which were
8 then adjusted to make them forward-looking for each existing tandem switch
9 in Virginia. These parameters were used to create SCIS model offices for
10 both DMS-200 and 5ESS technologies. SCIS then calculated, by switch
11 technology type, unit and total switch material investments for these
12 technologies.

13
14 **Q. Please describe how the tandem switching equipment was adjusted to be**
15 **forward-looking.**

16 A Tandem switches were adjusted in the same manner as previously described
17 for Local Switching.

18

19 **3. General Costing Approach**

20 **Q. Please describe the cost methodology used in developing the tandem**
21 **switching element.**

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1 A. The cost methodology used in developing the tandem switching costs is
2 consistent with the cost methodology described above for local switching.

3

4 **Q. How were the material investments for the tandem switch developed?**

5 A. The material investments for the tandem switch were developed using SCIS,
6 in the same manner described for local switching. However, the feature
7 module of SCIS was not required because trunk features are provided solely
8 by the software and processor.

9

10 **Q. Please explain how RTU was included in tandem switching?**

11 A. RTU was included in tandem switching in the same manner as previously
12 described for local switching.

13

14 **E. TOPS SWITCHES**

15 **Q. What is a “TOPS” switch?**

16 A A TOPS (Telephone Operator Position System) switch is the switch type
17 utilized for routing Operator Services calls in Verizon VA’s network. A
18 TOPS switch is a type of tandem switch.

19

20 **Q. Why is Verizon VA providing unbundled access to its TOPS switches?**

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1 A. Verizon VA provides access to its TOPS switches for CLECs that choose
2 Verizon VA as their OS/DA provider. However, the costs associated with
3 operator services and directory assistance calls once they have been routed
4 and switched to the Verizon VA OS/DA platform are not included in the
5 filing because Verizon VA is not required to provide OS/DA at UNE prices.

6

7 **Q. What cost elements has Verizon VA identified for access to TOPS**
8 **switches?**

9 A. Verizon VA has identified the investment and associated cost for a DS1 level
10 trunk termination. The cost is assessed on a per-trunk basis for dedicated
11 trunks, and on a per MOU basis for common trunks.

12

13 **Q. Please define the TOPS trunk port element used in Verizon VA's study.**

14 A. The TOPS trunk port element used in Verizon VA's cost study consists of
15 digital DS1 trunk ports. Trunk ports can be either dedicated or common.
16 Costs of dedicated trunk ports are recovered on a monthly recurring basis;
17 costs of common trunk ports are recovered on a per MOU basis.

18

19 **Q. Please describe the forward-looking TOPS switch construct.**

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1 A. The forward-looking TOPS switch construct is based on Nortel's DMS-200
2 technology, the most current technology available, placed at current TOPS
3 locations.

4

5 **Q. How did Verizon VA determine the forward-looking construct?**

6 A. The forward-looking DMS-200 TOPS switches were developed by reviewing
7 all of Verizon VA's TOPS switches in Virginia, and adjusting them to make
8 them forward-looking, based on current growth trends in the same manner
9 previously described for local switching. The forward-looking offices were
10 then used as the basis for determining the investments associated with the
11 TOPS switching element.

12

13 **Q. Please describe the cost methodology used in developing the TOPS trunk**
14 **port cost.**

15 A. The cost methodology used in developing the TOPS port cost is consistent
16 with the cost methodology described above for the local switching trunk port
17 cost above.

18

19 **Q. How were the material investments for the TOPS developed?**

20 A. The material investments for the TOPS were developed using SCIS, in the
21 same manner described for local switching. However, the feature module of

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1 SCIS was not required because trunk features are provided solely by software
2 and the processor.

3

4 **Q. Please explain how RTU was included in TOPS Switching.**

5 A. RTU was included in TOPS switching in the same manner as previously
6 described for local switching.

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**VII. INTEROFFICE TRANSPORT AND ENTRANCE FACILITIES
(JDPL Issues II-1 to II-1-d; II-2-c-d; IV-30; IV-36)**

Q. What will this section of the testimony address?

A. This section of the testimony will address the recurring costs associated with providing interoffice transport and entrance facilities. Specifically, it will address the differences between dedicated and common transport; the calculation of recurring costs associated with different types of dedicated transport facilities; the calculation of recurring costs associated with providing common transport; and the calculation of recurring costs associated with different types of entrance facilities.

Q. What is interoffice transport?

A. Interoffice transport refers to the transport of circuits between Verizon VA central offices. There are two types of interoffice transport: dedicated transport and common transport. Dedicated transport allows CLECs to connect CLEC collocation facilities at the DS1, DS3, STS-1, OC3, and OC12 signaling rates. Common transport is provided to CLECs that purchase the UNE-Platform and is necessary to deliver calls placed to or from UNE-Platform lines.

Q. What are entrance facilities?

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1 A. Entrance facilities connect a CLEC central office or POP to a Verizon VA
2 central office.

3

4 **A. INTEROFFICE TRANSPORT**

5 **Q. Please describe the Interoffice Transport (or IOF⁸) element.**

6 A. The element is defined as follows in FCC Rule 47 C.F.R. § 51.319(d).

7 Interoffice transmission facilities. An incumbent LEC shall provide
8 nondiscriminatory access, in accordance with § 51.311 and
9 § 251(c)(3) of the Act, to interoffice transmission facilities on an
10 unbundled basis to any requesting telecommunications carrier for the
11 provision of a telecommunications service. . . .

12

13 (1) Interoffice transmission facility network elements include:

14

15 (i) Dedicated transport, defined as incumbent LEC
16 transmission facilities, including all technically
17 feasible capacity-related services including, but not
18 limited to, DS1, DS3 and OCn levels, dedicated to a
19 particular customer or carrier, that provide
20 telecommunications between wire centers owned by
21 incumbent LECs or requesting telecommunications
22 carriers, or between switches owned by incumbent
23 LECs or requesting telecommunications carriers;

24

25 (ii) Dark fiber transport, defined as incumbent LEC optical
26 transmission facilities without attached multiplexing,
27 aggregation or other electronics;

28

29 (iii) Shared transport, defined as transmission facilities
30 shared by more than one carrier, including the

8

IOF stands for Interoffice Facilities.

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incumbent LEC, between end office switches, between end office switches and tandem switches, and between tandem switches, in the incumbent LEC network.

1. Dedicated Transport

a) Element Description

Q. Please define the dedicated interoffice transport element used in Verizon VA's forward-looking incremental cost study.

A. The Dedicated IOF element is defined as IOF transmission facilities dedicated to a particular customer. Dedicated IOF is offered between Verizon VA-owned wire centers at the following signaling levels: DS1, DS3, STS-1, OC-3, and OC-12. Dedicated DS3 transport consists of a two-point digital channel that provides for simultaneous two-way transmission of digital electrical signals at a transmission rate of 44.736 Mbps. Dedicated DS3 transport provides for the equivalent of 28 DS1 channels or 672 analog voice grade channels. STS-1 provides a total bandwidth of 51.84 Mbps, including both overhead and payload. OC-3 transport provides the equivalent capacity of three DS3 facilities, and OC-12 transport provides the equivalent capacity of 12 DS3 facilities.

Monthly costs have been identified on a "fixed" basis and a "per mile" basis for each signaling level facility.

Q. What are the fixed (non-mileage-sensitive) costs of dedicated transport?

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1 A. In general, the fixed investments are those investments identified at the
2 originating and terminating Verizon VA wire centers, which include
3 electronic equipment such as SONET add/drop multiplexers, digital cross
4 connect systems (DCS), and fiber terminations.

5
6 **Q. What are the per-mile costs of dedicated transport?**

7 A. In general, the per-mile costs represent those investments which vary with the
8 length of the facility and contain interoffice fiber cables, structure, and any
9 necessary electronics at intermediate Verizon VA serving wire centers for
10 when a circuit traverses an additional ring.

11

12 ***b) Technology Assumptions***

13 **Q. What is the forward-looking IOF construct used as the basis of**
14 **developing the costs associated with dedicated IOF transport?**

15 A. Verizon VA is using SONET fiber optic transport rings for growth
16 applications in the interoffice network. The IOF Transport cost studies have
17 been based on facility models which are schematics representing equipment
18 routing using this construct. The facility models were created to serve all
19 signal levels (DS1, DS3, STS-1, OC-3, OC-12). Additional detail is
20 provided in the Cost Manual, Attachment B.

21

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1 *c) Utilization*

2 **Q. How is utilization accounted for in the transport study?**

3 A. Interoffice transport elements (DS1, DS3, etc.) must pass through one or
4 more levels of multiplexing to be carried by the backbone transport network.
5 As is the case with all network capacity, the interoffice facility multiplexing
6 equipment, including electronic digital cross-connect machines, cannot be
7 operated at 100% of capacity. A reasonable utilization level must be
8 estimated for these elements. The factors of significant interoffice facility
9 growth, churn, equipment breakage, and administrative spare must all be
10 reflected in the utilization level. Based on these factors, Verizon VA
11 estimated that the forward-looking utilization level would be [VERIZON
12 VA PROPRIETARY BEGINS] XXX [VERIZON VA PROPRIETARY
13 ENDS].

14
15 *d) Costing Approach*

16 **Q. What is the basis for the IOF material and installation prices?**

17 A. Material prices for electronic equipment reflect the latest negotiated contract
18 prices Verizon VA has with the manufacturers of the circuit equipment. The
19 material prices were multiplied by the circuit equipment investment loading
20 factors to arrive at a total installed investment. Per-unit investments

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1 associated with fiber cable, which already include installation and
2 engineering, were obtained from the VRUC system.

3

4 **Q. How were the costs for the unbundled transport elements developed?**

5 A. Transport costs are divided into fixed and variable costs. Fixed costs do not
6 vary by the length of the IOF facility (*e.g.*, electronic equipment located at the
7 originating and terminating Verizon VA serving wire centers), and variable
8 costs vary with the length of the IOF facility (*e.g.*, interoffice fiber cable, and
9 intermediate structure and electronics). Since variable charges are applied on
10 a per-airline-mile basis (in increments of one-tenth of a mile) using the
11 Vertical and Horizontal coordinates, the costs are also determined on an air-
12 mile basis. To do this, the mileage costs, which are determined on actual
13 route miles, are converted to air miles.

14 Current contract prices and information from Verizon VA's vendors
15 and/or its engineering organization were utilized to compile the material
16 investments for the major equipment components of the circuit designs for
17 the different transmission speeds. Verizon VA then applied the material
18 prices to typical equipment configurations. Next, Verizon VA applied
19 investment loading factors to the material investments to include the
20 associated power, installation, and engineering costs and then applied a
21 utilization factor to arrive at a total installed unit investment. Land and

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1 building investments were calculated by applying investment-based factors to
2 the loaded investment.

3 Then, various circuit designs were populated (supplied by the
4 planning engineers) with the network element investments. The designs were
5 weighted according to frequency of use to determine an average circuit
6 investment per service at the DS0 level. That figure, in turn, was multiplied
7 by the number of DS0s in the service to yield the appropriate investment
8 level for that service. For example, DS0 level investments would be
9 multiplied by 2016 to arrive at a OC-3 level investment for OC-3 level
10 services.

11 Finally, Verizon applied ACFs to each investment account in the
12 typical circuit design to derive annual fixed and variable costs, each of which
13 were then divided by 12 to derive monthly costs.

14

15 **Q. Are structure investments included in the IOF study?**

16 **A.** Yes. Outside plant interoffice structure investments were determined using
17 the same methodology as previously described to determine loop structure
18 investments.

19

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1 **B. COMMON TRANSPORT**

2 **Q. Define the common interoffice transport element used in Verizon VA's**
3 **forward-looking incremental cost study.**

4 A. The Common IOF Transport element is defined as IOF transmission
5 facilities, specifically interoffice trunking, shared by Verizon and other
6 carriers using Verizon's existing switch routing. It is purchased on a per-
7 minute-of-use basis by CLECs who utilize the UNE platform without
8 customized routing in their network. Common IOF transport is offered
9 between Verizon VA-owned switches, and it contains components that are
10 costed on a fixed and per-mile basis.

11

12 **Q. How were the costs developed for the common IOF transport element?**

13 A. The equipment components for the fixed costs include SONET add/drop
14 multiplexers, the cross connect systems and cross-connect bays. The per-
15 mile costs include fiber facilities, poles, conduit and intermediate channel
16 terminations. The investments are converted to costs using the same
17 methodology as previously described. These costs are then divided by the
18 average number of minutes of use per trunk to derive a cost per minute of
19 use.

20